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From the Technology Gap to the Graduation Gap: Implications of Technology Access and Postsecondary Success

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FROM THE TECHNOLOGY GAP TO THE GRADUATION GAP: IMPLICATIONS OF TECHNOLOGY ACCESS AND POSTSECONDARY SUCCESS

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CHAPTER ONE

AN INTRODUCTION TO TECHNOLOGY AND POSTSECONDARY EDUCATION

Technology access is fundamental to postsecondary success. As modern universities have "aggressively implemented the use of laptops, notebooks, and tablet computers in their curriculum", technology has become a basic element of college coursework (Maxwell & Banerjee, 2013, p. 22). This thesis explores how the technology gap affects students academically at the university-level, because while technology access is a very tangible element of student success, exactly how different demographic groups of students, particularly students identified as less-likely to graduate, gain access has yet to be examined closely.

The Technology Gap

The technology gap's persistence and the large difference in availability of home technology between racial groups are pervasive signs of the inequalities that still exist within our society. Race is the greatest predictor of computer ownership; even when adjusted for socio-economic status, students of color are still less likely to have a computer at home (Jones, Johnson-Yale, Millermaier & Pérez, 2009, p. 249). As technology becomes increasingly integrated into the academic curriculum, limited access creates obstacles to completion of basic coursework. The internet is a "major mechanism" for communication with faculty and collaboration with classmates (BrckaLorenz, Haeger, Nailos & Rabourn, 2013, p. 5). Students without internet access will simply be unable to utilize materials, communicate with colleagues, reach out to professors, and in some cases, turn in assignments and receive grades.

This is not to mention the simple convenience of the internet, from research, to communication, to word processing. Students with access can complete assignments large and small with greater ease and less stress. The expectation is that students will have access to these tools, and faculty adjust course designs according to that assumption, which in turn puts extra pressure on students who do not have a personal computer.

For students without a personal computer, the library seems like a logical substitute. However, students of color who use campus libraries and labs must do so at a potential psychological cost. Students of color frequently describe feeling unsafe and unwelcome at campus libraries (Elteto, Jackson & Lim, 2008, p. 334; Whitmire, 2004). While students are at the library to utilize the community technology resources, they may still not be investing as much time in their studies as they would on a personal computer; a gap in access still exists.

Closing the Gap

This study contributes to the scholarship on increasing graduation rates among communities of color, by giving much needed context to the discussions surrounding the technology gap. By examining the daily workings of students of color, and comparing those findings to other groups, we can better identify points at which they meet institutional barriers, which slow their progress toward matriculation. The eventual removal of these barriers could mean significantly more students of color successfully completing postsecondary programs.

A college degree is increasingly essential for economic stability, and initiatives to grow enrollment have shown great success, the same attention must be paid to increasing program completion. There can be no hope of widespread economic shifts without first closing the graduation gap. While many are addressing institutional racism and the ways in which students of color are discriminated against on college campuses, the less rhetorically exciting

logistical problems can often be ignored. However, while these issues are sometimes labeled as comparatively trivial, they are just as essential to remaking the postsecondary experience of students of color.

The purpose of this study was to further the information available on the daily experiences of undergraduate students. This paper will detail the present studies in technology access in a literature review. The methods used to plan, implement, and draw conclusions from this study, and the data collected will be thoroughly discussed and the conclusions that can be drawn will be supported and explained. Finally, this paper will conclude with the implications of these conclusions as applied to the future of undergraduate education. The data from the survey indicates that a gap in technology access does exist, and could have serious consequences for already at-risk students. The survey also illuminated a common pattern in how undergraduate students use technology to complete their coursework, students are even more engaged and flexible in how they work academically than predicted.

CHAPTER TWO

A REVIEW OF RESEARCH LITERATURE

There a number of confounding variables as researchers examine the success of students of color. Students of color have the same academic and professional pressures as white students, with a number of additional institutional barriers to contend with as well. The graduation gap has been well-documented, and many of the elements that contribute to the attrition of students of color have been thoroughly examined. However, as technology is a relatively new addition to the world of postsecondary academia, it has not been studied as closely as the financial, social and emotional obstacles. Also, within higher education, there are numerous groups that appear to be at a disadvantage, and many students of color belong to more than one of these groups. Within the study of technology, it is important to account for how the intersection of these students' identities can further exacerbate institutional barriers.

Success and Postsecondary Students of Color

Students of color can be broadly defined as "all/any peoples of African, Latino/Hispanic, Native American, Asian or Pacific Island descent, and its intent is to be inclusive" (Malesky, 2014, p. 15). For this literature review, the experience of Asian American students will not be discussed, as Asian American adults statistically have the most access to technology and home internet of any racial group (Perrin, 2016). This paper will address the intersectional identities of many students of color. These students are more likely than white students to identify as

nontraditional, first-generation, or "basic needs insecure" (Goldrick-Rab, Richardson, Schneider, Cady, & Hernandez, 2018, p. 1; Ntiri, 2001; Redford, & Hoyer, 2017).

Social and Emotional Stressors.

Most students of color attend "primarily white institutions", which for some presents a completely new social environment, adding to the difficulty of transition into university study (Keels, 2013, p. 311; Elfman, 2015). Any student must adjust to meet new "social, personal-emotional, and academic" expectations; and students who report difficulty socially adjusting to college are more likely to suffer from feelings of "loneliness, anxiety, and depression" (Gray, Vitak, Easton & Ellison, 2013, p. 194). Most students who drop out of college do so during the first year, indicative that this "transition process" is a key factor in whether or not students continue their studies (Gray, Vitak, Easton & Ellison, 2013, p. 194).

For many students of color, nonacademic variables may be the most important when it comes to retention versus attrition (Gray, Vitak, Easton, & Ellison, 2013; Mallinckrodt & Sedlacek, 2009). Wei et al. (2010) elaborate on how "minority stress" affects students of color from all ethnic and racial backgrounds; for Hispanic American students, this resulted in lower self-esteem and higher psychological stress (p. 412). For African American and Latino American students, perceived racism and low academic expectations correlates with low academic retention (Wei et al., 2010). For Native American students, lack of institutional support, the feeling of being "intensely alienated on campus", and racism at both the individual and institutional level all contribute to the decision to drop out. Native American college students have the "lowest retention rates, with 43.0% of students who enrolled in 2003 dropping out by 2009" (Fish, Livingston, VanZile-Tamsen & Patterson, 2017, p. 413).

Once enrolled, a student's on campus "social support network" is essential to success, and persistence of students of color at primarily white institutions is bolstered by "the formation of a same race social group on campus" (Keels, 2013, p. 311). Students of color rely on both on campus social networks and family support to remain successful. Gray, Vitak, Easton, and Ellison (2013) discuss how social media tools may serve to "scaffold the social adjustment process for students from diverse backgrounds including minorities and first-generation college students" (p. 203). These same "information communication technologies" aid in maintaining familial relationships once at least one member has left the family home to begin college (Lindell, Campione-Barr & Killoren, 2015, p. 573). This is an essential component to student success, family support is strongly correlated with academic self-efficacy, ensuring that students develop into confident learners (Torres & Solberg, 2001).

Financial Burden.

Students of color face unique risks in paying for a college degree (Grinstein-Weiss, Perantie, Talyor, Guo & Raghavan, 2016, p. 166). Latino students borrow at the same rate as white students, but that same debt load is more likely to result in Latino students dropping out (Demos, 2016; Tran, Mintert, Llamas, Lam & Lee, 2018). Black students are disproportionately over indebted, compared with proxies in all other racial and ethnic groups, "Black college students incur the highest amount of federal education debt" (Grinstein-Weiss, Perantie, Taylor, Guo & Raghavan, 2016, p. 166).

Rather than take out loans, some students choose to approach higher education nontraditionally. Over the last decade nontraditional students of all types have increased more than 35 percent, however the rate of students of color studying part-time is growing more rapidly

than for white students (Goings, 2017; Ntiri, 2001). Of all Black undergraduate students, 65 percent are classified as nontraditional, with Black females re-entering as adults with family obligations and full-time jobs as the largest subgroup of nontraditional students (Goings, 2017; Ntiri, 2001). Not only may students of color feel unwelcome and uncomfortable at campus libraries and labs, students who live off campus may simply have fewer alternatives to home computers from which to choose (Fairlie, 2012). Usage patterns show that people of color and low-income individuals are the most likely to use their public library for internet or computer access, of those individuals 60 percent of their use was focused on research for school or work (PEW, 2015). However, people in low-income neighborhoods live farther from public libraries, "making regular access more difficult" (Gordon, Moore & Gordon, 2003, p. 16). This is unfortunate, because a high proportion of nontraditional students express clear preference for using the public library over the campus library (Antell, 2004). The appeal of public libraries over campus libraries is two-fold; not only do commuter students find the idea of resources convenient to home attractive, but the staff at public libraries was repeatedly described as more helpful and friendly than that of the university library (Antell, 2004).

Causes of the Technology Gap Among Postsecondary Students

79 percent of white adults own a laptop or desktop computer, the numbers are 63 percent of Hispanic adults, and only 45 percent of Black adults respectively (PEW, 2015).
While this looks promising for Hispanic students, only 47 percent of Hispanic households have internet broadband access, as compared to 57 percent of Black households and 72 percent of white households (PEW, 2018). Native American households rely on internet access outside the home more than any other group (Stenberg, 2018).

Black students represent 14 percent of first generation students, compared to 11 percent of continuing-generation college students. Hispanic students represent 27 percent of first-generation college students, compared to 9 percent of continuing-generation students (Redford & Hoyer, 2017). Native Americans have the lowest graduation rates of all ethnic groups and "remain the most underrepresented ethnic group within the college student population, constituting 0.9% of undergraduate students", resulting in many Native American students being the first in their families to attend college (Fish, Livingston, VanZile-Tamsen & Patterson, 2017, p. 414). Education level is important in predicting technology use; a higher proportion of students of color as first-generation students, explains why numerous first-generation students of color are simply less likely to have home technology access (PEW, 2010).

Use of academic facilities, such as campus libraries, is a "significant predictor" of retention for students of color (Mallinckrodt & Sedlacek, 2009, p. 568). Hispanic students are the least likely to use the campus library for "long periods of time" on average as compared to white and Black students. By a slim margin, Black students are more likely to utilize the libraries and labs than white students, perhaps because studies show fewer Black students own personal laptops (Elteto, Jackson & Lim, 2008; Jones, Johnson-Yale, Millermaier & Pérez, 2009, p. 257). Strayhorn and Terrell examine why students of color are less likely to persist in finding technology to use outside of the home. These students often talked about being "the only Black person" in the library and they felt that white students and faculty "questioned" their presence (2010, p. 133). This sentiment holds true for students of Hispanic and Native American heritage as well (Fish, Livingston, VanZile-Tamsen & Patterson, 2017; Lumley, Newman & Brown, 2015). Academic libraries tend to "reflect Anglo cultural values and systems. This is observed

in the language of their signage, the details of their book collections, the level of noise that is tolerated, the types of activities that are encouraged…and the demeanor of the…staff" (Lumley, Newman & Brown, 2015, p. 49). Students of color across the board describe library staff as unfriendly and unhelpful (Elteto, Jackson & Lim, 2008).

Immediate Consequences of Limited Technology Access.

Technology access refers to more than just a computer with basic internet access. Specifically, twenty first century academia requires Web 2.0 tools. These are defined as tools that provide advantages to the process of teaching and learning by increasing collaboration, promoting communication, and facilitating learning, all while enhancing creativity and motivation. These tools also "score high on usability" with a "rich user experience" and "client side programmability" (Daher & Lazarevuc, 2014, p. 43; Kurilova & Juskeviciene, 2015). Examples of Web 2.0 tools are web applications, content syndication, wikis, blogs, audio and video conferencing, all of which require significant bandwidth in addition to the proper computing hardware (University of Delaware, 2018). Another major change to the way every day classwork is organized is the implementation of course management software.
While course management software is another internet communication tool, it also increases the efficiency of materials distribution, and even allows for students to access resources that may not have been available in hardcopy (BrckaLorenz, Haeger, Nailos & Rabourn, 2013, p. 6).

All of the aforementioned aspects of the college experience of students of color must be made sense of through the lens of technology access, technology skills are the defining element of academic success in the twenty first century. Technology has the potential to both exacerbate and alleviate the barriers to success for students of color. This all bears on us determining how

exactly undergraduate students as a whole are utilizing technology now, so we can support improvements in access for students in need, that will dramatically change the college experience for many students of color. The technology gap has been documented in broad strokes, and the how and why has begun to emerge, but the consequences cannot be examined as they should be because the finer points of these students' experience have been ignored. This work focuses on fleshing out the data on how undergraduate students use technology, in order to support further work that may connect these day to day work habits to the bigger picture of graduation rates and post graduate success. This work is essential to lay the ground work for studies that draw together how all students as compared to students of color access technology and how that affects larger graduation trends. This also has the potential to inform policies that promote success for all students.

CHAPTER THREE

MEASURING THE TECHNOLOGY GAP

A number of scholars have researched areas related to how the technology gap is represented among college students, though few have asked the direct questions needed to identify and quantify the extent to which it exists. This study aimed to answer the questions "How do they use technology to complete coursework? Does that access differ among demographic groups?". This section focuses on the implementation of the study, and on the process of analyzing the data collected. Throughout the data analyzation process, Lauree Garvin of Loyola University Chicago, has consulted and advised on data organization and interpretation

Historical Efforts

Going as far back as the mid-1990s, campus surveys studying student experience included questions about technology access and use. Pace and Kuh (1998) explored what types of technology students accessed on campus, and how often. At the time, technology included computer word-processing, email, and developing web pages (Pace & Kuh, 1998).

More recent surveys tend to focus on the adoption patterns of specific technologies or behaviors, such as Foasberg's (2011) exploration of e-readers, Cho, Quinlan, Park & Noh's (2014) focus on smartphone health applications, and Correa's (2010) study of web content creation. While these studies do not answer the research questions put forth in this study, they provide context to the technology gap, and a set of best practices for examining technology-use on college campuses.

Outside of college campuses, the Pew Research Center is a source of data on technology access and use. The researchers at Pew have studied and described the behavior of adults using twitter (Wojcik & Hughes, 2019), device ownership (Hitlin, 2018), even utilization of digital voice assistants (PEW, 2017), among numerous other studies focused on technology use and adoption among adults in the United States. Similar to the studies conducted among university students, these reports answer many questions about what is happening in technology across America, and they provide models of reliable, and valid, survey instruments and procedures that can be adapted to the further exploration of technology among university students.

College campuses are truly different than other communities. College students may adopt technology earlier, and may use technology more often than their counterparts who are not university students. Similarly, many college students live in a sort of financial "limbo", while their income may be low, or non-existent, they have access to resources that are out of reach for other individuals in the same income bracket. Even students who effectively live in the "red", amassing student-loan debt, may be able to use the latest technologies available. College campuses are also often centers experimentation and change, students are by nature a transient population interested in new ideas and pushing boundaries. All this suggests that researchers focused on college students must look for different demographic characteristics to identify patterns in ownership and use. Researchers need to identify what, if any, links exist between demographic identification and technology use patterns, outside of the typical gender, racial, and ethnic groupings used in many surveys. This work is essential because identifying the way in which the majority of students use technology will allow schools to better support the students who are not fully utilizing the benefits of technology. This is only possible when researchers

begin to adapt research methods to the desired participants, and expand the possibilities for what information from respondents can be useful

Research Methodology.

A survey was the ideal research tool for this study, as this research is focused on collecting information on categories of behaviors and opinions from a specified group. Surveys allow participants to self-report data, proving time and cost efficient for the researcher (Johnson & Christensen, 2014). An online survey allows for a large number of responses to be collected quickly. Also as surveys are "self-report data-collection instrument[s]", participants can respond in a discreet manner, encouraging participants to provide information about their habits without concern that their peers will overhear or observe their response (Johnson & Christensen, 2014, p. 274).

For this research project, social media was utilized as the primary mode to recruit participants for a short survey. Though social media is relatively new among recruitment tools, other studies have found that "incorporating the use of social media proved to be an effective, time and resource-efficient recruitment strategy" (McRobert, Smale, Hay, van der Windt, 2018, p. 2). Flyers were displayed in undergraduate residence halls at Loyola University Chicago, Lake Shore Campus as well. Permission was requested for the survey to be distributed at another university, but was denied given the administration felt their student body was suffering from survey fatigue. As respondents posted the link on their social media profiles, there were participants from institutions beyond Loyola, but no other institution formally allowed flyers to be posted or for the survey to be distributed through official university avenues. The focus on social media was one reason that this study leant itself well to snowball sampling. As the

targeted demographic was undergraduate students, how they communicate most comfortably and regularly had to be taken into consideration during the recruitment process. Social media not only maintains a comfort level for the potential respondents, but allowed for more potential respondents to be contacted more quickly.

Using an online platform for survey distribution and data collection ensured the participants' privacy, as respondents' responses were never available outside of a secure, online account, and it was easier for the respondent to complete. An online survey allowed for the immediate collection of responses without requiring additional effort to get returned and completed surveys. A survey is also more user-friendly, and easier for respondents to complete. Participants could complete the survey in five minutes or less from any device connected to the internet. Capturing the attention and time of busy undergraduates is difficult, it was important to ensure that it was as painless as possible for participants, to encourage responses and sharing. This survey focused on quantifiable data. While qualitative data about undergraduate students' experience with technology will be undoubtedly valuable as this research area is fleshed out, there is very little baseline data about the basic questions. Put simply, no one has counted how many people have access to what, and this survey intended to remedy that.

The nature of social media lent itself to snowball sampling, as respondents could share the survey link with their peer groups and increase the number of respondents completing the survey. This was evidenced by the "bursts" in response rate, as participants would share the link and their social network would react immediately and click the link.

Snowball sampling also played a role in how participants were identified for this study. Snowball sampling relies on participants playing a part in the recruiting process, the survey was

first shared by students who are confirmed as undergraduate students, these students recruited members of their peer groups, for whom they presumably knew the educational status. There were demographic questions included within the survey to confirm participants' membership within the targeted undergraduate demographic. This recruitment technique proved effective as only two respondents out of the 54 that began the survey selected that they were not an undergraduate student over the age of 18, resulting in 52 valid responses. Snowball sampling is particularly helpful when potential respondents are hard to contact or find. In this case, potential respondents may have been difficult to contact because of their scheduling restrictions. More and more students are not spending their free time in campus common areas, in fact not all undergraduate students even take classes that require in-person meetings, and fewer professors are inclined to lend class time to survey distribution. Similarly, because undergraduates have become an increasingly diverse group overall, predicting how and when they are able to be contacted can be difficult. One of the few common denominators among most undergraduate students is the access to social media and smartphones, utilizing these methods was far more successful than the traditional location-based recruitment of posting flyers.

Survey Instrument Development.

Developing a survey instrument for this study required careful consideration of the delivery method, potential participants, and best practices as modeled in other technology access surveys. The technology access questions were modelled after the Seattle IT connectedness segmentation study, as part of the city's digital equality initiative (PMR, 2018). This survey was commissioned to identify the barriers that citizens of Seattle may experience in accessing technology, and some questions were easily modified to apply to college students who may also

experience barriers to technology access. The demographic questions were added in anticipation of parsing data based on participants belonging to certain demographic groups that have lower graduation trends, including race, non-traditional status, college funding sources, and generational status. These questions were inspired by the demographic questions routinely used in survey research, the financing question was specifically modelled after Pace and Kuh's (1998) college student experiences questionnaire. The demographic questions also include a disqualifying question, as this study pertains specifically to undergraduate students, potential participants must be enrolled in undergraduate courses and over the age of 18 to be considered.

Survey Distribution and Data Collection.

The process began with the distribution an online survey of the researcher's own creation to a small group of undergraduate students at one university, with the request that they share it with as many of their peers as possible. They shared this secure link through social media platforms, including Twitter and Facebook. Research on patterns of social media use shows that after three days, shares across "all social media networks, drops at least 96 percent" (Tornoe, p. 3, 2014). Resharing content is essential, but has its limits, research suggests "it's best to wait at least a week until resharing", the same study suggests that it is essential not to "overload" the intended audience, and in fact drive down engagement with the content (Tornoe, p. 3, 2014). Considering the research on the lifespan of viral, internet content, data was collected over two weeks, and the link was "reshared" again at the end of these two week intervals until there were a sufficient number of responses, this "resharing" process was completed three times. All respondent responses were automatically recorded within the online survey platform.

Data Analysis

The data for this study was gathered through the online survey platform Opinio, and that data was imported into SPSS to perform analysis. A total of 52 valid responses were received, just exceeding the target of 50 set during the planning of this study. Two questions required respondents to select answers along a nominal scale, these questions were: "how often do you use each of the following devices to complete assignments for your classes" and "how often do you use each of the following locations to access the internet/wifi to complete assignments for your classes?". These questions were answered using the same scale; respondents were required to select never, less than monthly, monthly, weekly, or daily to indicate their frequency of use for each option. This nominal scale was then translated into numerical values; with "never" becoming one, and each option increasing by one until "daily" was given the value of 5.

For gender identity, respondents were given the options male, female, non-binary, prefer not to say, and prefer to self-describe. Of the 52 responses, only 2 selected non-binary, 1 self-described, and 1 preferred not to say. These numbers are simply too low to use for significant analysis based on their gender identity. For enrollment, only 4 students out of all 52 replied that they were part-time, a number too low to make any statements about what relationship may exist between enrollment status and technology use. Similarly, the demographic question addressing race did not produce data that could be used for a full chi-square, as only four groups responded in numbers high-enough to run a chi-square, Asian, African American/Black, Latino/Hispanic, and white. Lastly, income was categorized by how students meet their college expenses, the only categories that received enough responses were loans, grants, familial-support, and self-support. To make sense of the income groupings, larger general groups were created. Two major groups

were organized, those who use grants to meet half or more of their college expenses, and those who did not. This relies on the assumption that those who are receive more grant money are lower on the socio-economic scale, as compared to those students who utilize little to no grant money. While this type of generalized grouping does not allow for the detailed analysis that this study aimed for, it did allow for some broad conclusions that will support further research into this area.

Chi-square tests to examine possible relationships between the variables were part of the planned analysis, however the data collected on the different demographic groups was not conducive to running a valid chi-square test for all the demographic sub-groups. With an overall sample size of 52, it is recommended that there be a minimum expected value of 5 in all cells, and many of the demographic subgroups were simply too small. This was exacerbated by the use of a snowball sample, which skewed toward certain age and racial groups, making it difficult to draw any conclusions about differences based on race or non-traditional status. With the help of the Lauree Garvin of Loyola University Chicago, the data was put into various larger groupings, in an attempt to garner any results based on these demographic categories. However, even then, the output revealed no relationship and was drawn from such generalized categories that it was determined not to be valuable in this analysis. While this was somewhat expected, it is nonetheless frustrating. In retrospect, there are several changes that would have benefited the final outcome, which are detailed in the limitations section.

CHAPTER FOUR

FINDINGS AND DISCUSSION

This chapter focuses on the conclusions drawn from the data collected through this survey. The data indicates that a there is a distinct pattern to how undergraduate students utilize technology, and for some students these changing academic norms create additional pressure. The data analysis also points to these students belonging to groups that already have lower graduation rates, meaning that the obstacles facing these students are likely to grow more difficult to overcome, not less, as technology is further integrated into the academic curriculum. This section also details the limitations of this study, and suggests areas for future research. Lastly, this section includes implications of this study and any future studies in this vein.

Findings Summary

The information presented by the descriptive statistics leads to the conclusion that personal computers are not only the most universally used device, but also the most frequently used. Mobile phones are also widely used to complete coursework, and for many students they are a daily tool, whether in place of or in addition to their personal computer. The results of cross-tabulation show that most students are not using mobile phones as a replacement for computer use, but as a compliment.

Another notable finding is that most students access the internet at home. Unlike the responses for device preferences, there is not such a drastic difference between the different

places students access the internet. With multiple locations reporting high means and high modes, these results indicate that students regularly access the internet from multiple locations. This information, along with the high use of mobile phones, could be taken to mean that flexibility is very important to the modern college student, they access the internet to complete coursework whenever and wherever they can.

Device Use.

The descriptive statistics provided insight into the first research question, "how do university students access technology in order to complete their coursework?". A mean of 4.81 and mode of 5 indicates the majority of respondents must have selected daily use, which was translated as a 5. This is confirmed by the frequency chart, 45 out of 52 respondents or 86.5% across all demographic groups use a personal computer daily. This would track with most assumptions about modern college students, but the second highest mean was surprising, mobile phones had a mean of 4.17 and a mode of 5, indicating that for many mobile phones are used daily. This is confirmed with a frequency table which indicates that for 35 out of 52, or 67.3% of respondents a mobile phone is a daily tool, and for 5 it is weekly, indicating that during the average week of class 76.9% of these students are using their phone for school work. Please see appendix B for the full descriptive statistics for all technologies and the raw data for device use.

Table 1. Descriptive Statistics for Device Use

		Q2PersonalComputer	Q2FamilyComputerHome	Q2FamilyComputerAway	Q2PublicComputer	Q2Mobile	Q2Tablet
N	Valid	52	52	52	52	52	52
	Missing	0	0	0	0	0	0
Mean		4.81	1.73	1.38	2.48	4.17	2.02
Mode		5	1	1	1	5	1
Std. Deviation		.627	1.140	.820	1.321	1.396	1.565
Variance		.394	1.299	.673	1.745	1.950	2.451

Further insight was gained from the frequency tables, which were produced for the selections with three highest means, personal computer, mobile phone, and public computer. These frequency tables showed that 45 out of the 52 respondents indicated that they use a personal computer daily and only 1 responded never. Out of the 52 respondents, 35 use a mobile phone daily with 6 responding never, and for public computers only 4 respondents reported daily use, with the bulk of respondents reporting weekly (10), monthly (9), or less than monthly (13).

Cross-tabulation showed that there is an overlap of 30 daily users of personal computers and mobile phones, or 57.7% of this sample. Further cross-tabulation between mobile phone use and public computer use shows that only 12 of the daily mobile users use public computers as frequently as weekly or daily, leading to the conclusion that most students rely on both mobile phones and computers.

For respondents who identified as male, 87.5% reported using a personal computer daily, and 12.5% weekly, amazingly female students used personal computers at the exact same rate.

Using generalized variable categories for race, ethnicity and income-level, t-tests did not indicate any relationship between these demographic factors and what devices students used. Please see appendix b for the t-test results.

Wifi Use.

The descriptive statistics for where students access the internet revealed that home had the highest mean at 4.25 and mode of 5, campus library had a mean of 3.58 and a mode of 5, campus shared had 3.23 as a mean and a mode of 5. This indicates that the most popular place for students to access wifi is their own home, but that most students regularly access wifi in multiple locations. 38 out of 52 or 73% of students access the internet from home daily. Including students who report weekly access, which brings that number up to 80.77%. The only

location that was not as regularly selected was the public library, with 36 of 52 or 69.23% of respondents indicating they never use the public library. The raw data for internet access, and the descriptive statistics for each option can be found in appendix C.

Table 2. Descriptive Statistics for Wifi Use

		Q3CampusLib	Q3CampusShared	Q3Home	Q3FriendFamilyHome	Q3PublicLibrary	Q3PublicOther
N	Valid	52	52	52	52	52	52
	Missing	0	0	0	0	0	0
Mean		3.58	3.23	4.25	3.06	1.77	2.90
Mode		5	5	5	1[a]	1	3[a]
Std. Deviation		1.513	1.640	1.412	1.552	1.337	1.272
Variance		2.288	2.691	1.995	2.408	1.789	1.618

The frequency tables support this assumption, as the majority of responses for each location fell into the daily, weekly, or never categories. This indicates that students have a number of places they regularly access the internet, but that the number of places is limited, either it is somewhere they go frequently, or never, few indicated monthly or less than monthly visits.

Using a generalized variable, respondents were categorized into two broad categories for socio-economic status. Students who utilized grants to fund half or more of their education were classified as low-income, and students who used less than half to none, high-income. An independent-samples t-test was conducted to compare where low-income students access wifi as compared to where higher-income students access wifi. There was a significant difference in the means for low-income and high-income, respectively, access at home (M=4.67, SD=.92 and M=3.89, SD=1.66; t(50)= 2.03, p = .048), a friend or family member's home (M=3.63, SD=1.35 and M=2.57, SD=1.57; t(50)=2.57, p = .013), the public library (M=2.17, SD=.1.61 and M=1.43, SD=.96; t(50)=2.05, p = .046), and other public wifi access locations (M=3.38, SD=1.17 and M=2.5, SD=1.23; t(50)=2.61, p = .012). The means for each of those locations is significantly

higher for low-income students than for high-income students, indicating that comparatively low-income students access their course work more frequently and in more locations.

Explanations for this metric would be speculative, but this could point to low-income students having to take advantage of wifi when and where they can find, if they cannot be certain that they will have access at another time. This may also be a sign that low-income students don't have the option to work on their coursework for extended periods, and must find many, smaller breaks in their day to complete their assignments. Lastly, it could also be an indicator that these students need more time to produce their work, as compared to their higher-income peers.

Using the generalized variable categories for race and ethnicity, t-tests indicated no relationship between these demographic factors and likelihood of where students accessed the internet. Please see appendix c for t-test results.

Implications

This study was premised on two questions about undergraduate students. How do they use technology to complete coursework? Does that access differ among demographic groups? This study was able to address a gap in the research literature surrounding undergraduate students by providing insight into the first question.

The respondents of this survey overwhelmingly use personal computers to complete their coursework. The majority used both a mobile phone and a personal computer. This indicates that we have not hit the saturation point for incorporating technology into education. Students' academic performance will only continue to be predicated by their access to certain kinds of technology. As referenced in the literature review, technology access is only one of many "non-

academic" factors that can make or break student success. These elements are often more influential than academic struggle in determined whether students continue with their studies or not (Gray, Vitak, Easton, & Ellison, 2013; Mallinckrodt & Sedlacek, 2009). This study reveals just how much technology access may affect a students' ability to engage in their studies, illuminating an enormous potential obstacle for many students, especially those in lower socio-economic groups.

The necessity for all students to have access to highly mobile and flexible devices is indicative of a changing academic landscape in which students who cannot as nimbly interact with their classwork will be at a disadvantage. Now more than ever, students chained to a desktop computer, or other computer that has limits on when, were, and how, it is used, will be at a disadvantage compared to their peers who have multiple points of entry into the world of online academia. This is especially relevant as we consider the increased enrollment of non-traditional students. If the average student's lifestyle already requires they have the flexibility to complete coursework in a variety of settings, then that points to even greater difficulties for already at-risk groups such as commuter students, working students, parenting and caregiving students, and any other student pushed even further beyond the boundaries of traditional status.

As the students who do not have these tools becomes a smaller group, they will struggle to keep up with their peers as professors further adjust coursework to the abilities and access of the majority. It is encouraging to see that the majority of students have access to these technologies; however, as the group that does not shrinks, the understanding and accommodation for those individuals outside the norm will dwindle as well. The most direct solution is to ensure that all students have personal devices, and that wifi is widely available, including access to mobile hotspots for students who do not have reliable home wifi, this would remove one of many

non-academic obstacles that these students may face. However, this is not a problem that we can simply throw money at and walk away. Beyond every student having the access they need; every student must have the skills to use the technology appropriately to engage with their coursework. Many high schools have incorporated technology courses into their curriculum, however these skills do not automatically transfer at the practical skills students need to complete assignments. Students would be best served by high schools designing coursework to mimic college coursework, allowing them to practice flexibility and holding themselves accountable, in additional to practical twenty first century skills already being taught in computer classes.

This study indicates that this group is likely comprised of students who are lower on the socio-economic scale, a group that already faces significant obstacles in obtaining an undergraduate education. Baccalaureate and post-baccalaureate degrees are increasingly vital for anyone to remain afloat in the modern economy, low-income students who cannot readily utilize personal devices are further denied access to this level of education. As long as mobile phones and personal computers are expensive, there will be students who do not have access, and these students will not benefit from the upward economic mobility afforded by higher education. This serves to only further reinforce a cycle of poverty that has already plagued generations of Americans.

However, as stated in the limitations section, there remains many unanswered questions about how representative this study is of the broader undergraduate population. It is worth noting that the chi-square tests produced very little evidence of relationships between demographic factors and device or wifi use. The only valid result was the product of broad socio-economic groupings, this test did indicate that socio-economic status increases the likelihood that a student would use a shared or borrowed computer. From this survey's data, there is no indication that

race, ethnicity, or age have a relationship with device use patterns. This is may be due to the small sample size, and the snowball sample that led to uneven representation of the demographic groups. However, it cannot be ruled out that it may also point to undergraduate students have similar preferences and habits when it comes to technology use, as long as they have the same means and access.

Limitations.

This survey was not distributed to a random sample of undergraduate students. Because of limitation in identifying and contacting potential subjects, the responses could be skewed toward a particular social group, geographic area, or other grouping. The demographic questions included do indicate some groups as oversampled. Ideally, follow up surveys would have better representation from students over the age of 25, or attending part-time, which were two dramatically underrepresented groups among this study's respondents. Considering the findings of this study, the experiences of these groups of students are more important than ever. These are the students that may suffer the most from a lack of technology access, or struggle to engage as flexibly as their peers.

Similarly, the sample size for this survey was relatively small. This is not only because of the limited pool of subjects, but also because the nature of the social media distributed study does not lend itself to collecting data from a large number of people, as the lifespan for shared internet content is relatively short.

This study was not as all-encompassing as is needed to address all the gaps in the current research literature. While it would be ideal to follow up with these students over a long period of time in order to record their graduation status and draw direct conclusions between the earlier technology use patterns, this type of longitudinal study is beyond the scope of this thesis. Also,

this study did not touch on the ways that students use technology outside of academics as tools for social support. While this area of research will be important to investigate in the future, it is not necessary to make the argument that students need readily accessible technology to be successful in their post graduate studies.

In retrospect there were a number of design flaws that became apparent once responses were received and analyzed. It was expected that the sample would be weighted toward particular demographic groups due to the nature of recruitment, however, the degree to which the sample was homogenous was unexpected. It was the researcher's assumption that the nature of social media might reach beyond the typical limits of social groupings, but that was not the case.

Some issues with the survey design were not apparent until the data analysis stage. Specifically, the question addressing how students met the expenses associated with their studies was poorly designed, and it showed as many students simply answered the same amount for each funding source, despite the fact that for many this meant their selections would have added up to well over the total cost of their education. If I were to repeat this study, I would ask respondents to select the source they relied on for the majority of their expenses, with an additional question addressing their familial income in the year before they enrolled.

It would also have strengthened the data to include more demographic questions. Asking students to further identify other traits that would label them as "non-traditional" may have helped in analysis, rather than simply focusing on proxies for non-traditional status such as age and enrollment status. An additional demographic question could have addressed student family income. While this does not necessarily indicate the current financial status of a student, this would have nevertheless provided some insight into student relationships with technology. Lastly, in this same vein, it would have been helpful to ask students about whether or not they

work, and further details if they do. Students working full-time would immediately appear as non-traditional. Students working part-time would have also been helpful in further breaking down demographic groups, as where and how much those students work may create a more holistic picture of student financial status.

Conclusion

This study proved to be very informative, and the best questions don't always lead to answers, but to better questions. This study revealed some of the patterns in how undergraduate students utilize technology, and pointed to how this may create barriers for at-risk students. It can also serve as a guide for where we need to inquire next to further tackle this crisis. While these limitations could be looked at as disappointments, they point where this investigation needs to go. The goal is to make an undergraduate education accessible to all, and this is a step in the right direction.

APPENDIX A

SURVEY INSTRUMENT

Survey Instrument

Project Title: From the Technology Gap to the Graduation Gap: Implications of Technology Access and Postsecondary Success
Researcher: Abigail Evans
Faculty Sponsor: Katherine Phillippo

Introduction:
You are being asked to take part in a research study being conducted by Abigail Evans for a thesis project under the supervision of Kate Phillippo in the Department of Cultural and Educational Policy Studies at Loyola University of Chicago. You are being asked to participate in this study because you are a registered undergraduate student over the age of 18. Please read this form carefully and ask any questions you may have before deciding whether to participate in the study.

Purpose:
The purpose of this study is to collect information on the technology-use habits of undergraduate students from diverse backgrounds, and as a registered undergraduate student your experiences are valuable to understanding the spectrum of experiences among undergraduate students.

Procedures:
If you agree to be in the study, you will be asked to:

- Complete a short survey consisting of 9 multiple choice or rating scale questions
- This survey should take fewer than 5 minutes to complete

Risks/Benefits:
There are no foreseeable risks involved in participating in this research beyond those experienced in everyday life.

There are no direct benefits to you from participation, but research in this area is essential to universities and other higher education institutions as they work to support undergraduate students from diverse backgrounds.

Confidentiality:
Your responses are completely anonymous. Your identity and contact information will not be recorded in any way. All data will be deleted after completion of the thesis defense

Voluntary Participation:
Participation in this study is voluntary. If you do not want to be in this study, you do not have to participate. Even if you decide to participate, you are free not to answer any question or to withdraw from participation at any time without penalty

Contacts and Questions:
If you have questions about this research study, please feel free to contact
Abigail Evans at aevans6@luc.edu or the faculty sponsor Kate Phillippo at kphillippo@luc.edu

If you have questions about your rights as a research participant, you may contact the Loyola University Office of Research Services at (773) 508-2689

Statement of Consent:
Clicking next indicates that you have read the information provided above, have had an opportunity to ask questions, certify that you are at least 18 years of age, and agree to participate in this research study

1. Are you a registered undergraduate student over the age of 18? (disqualifying question)

   ☐ Yes
   ☐ No

(in the event of a "no") Thank you for participating in this survey! This survey focuses solely on undergraduate students, and I will not require any further response from you. If you are an undergraduate student, please go back and change your response to "yes"/

2. How often do you use each of the following devices to complete assignments for your classes? (Assignments may include writing papers, performing research, accessing readings, online discussion groups, homework assignments, take home exams, and communicating with classmates and professors.)

Your personal computer (laptop or desktop)	Daily	Weekly	Monthly	Less than monthly	Never
A family member's personal computer in my current home	Daily	Weekly	Monthly	Less than monthly	Never
A friend or family member's personal computer outside of my current home	Daily	Weekly	Monthly	Less than monthly	Never
Public computer (i.e. campus or public library/lab)	Daily	Weekly	Monthly	Less than monthly	Never

Mobile phone	Daily	Weekly	Monthly	Less than monthly	Never
Tablet	Daily	Weekly	Monthly	Less than monthly	Never
Other (please specify _____)	Daily	Weekly	Monthly	Less than monthly	Never

3. How often do you use each of the following locations to access the internet/wifi to complete assignments for your classes? (Assignments may include writing papers, performing research, accessing readings, online discussion groups, homework assignments, take home exams, and communicating with classmates and professors.)

Campus library or lab	Daily	Weekly	Monthly	Less than monthly	Never
Other campus shared space (i.e. student union, dormitory common room)	Daily	Weekly	Monthly	Less than monthly	Never
At home	Daily	Weekly	Monthly	Less than monthly	Never
At a friend or family member's home	Daily	Weekly	Monthly	Less than monthly	Never
Public library	Daily	Weekly	Monthly	Less than monthly	Never
Other public shared space (i.e. coffee shop, community center)	Daily	Weekly	Monthly	Less than monthly	Never
Other (please specify _____)	Daily	Weekly	Monthly	Less than monthly	Never

4. Are you a first-generation college student?

   ☐ Yes
   ☐ No

5. Are you a part-time or full-time student?

   ☐ Part-time
   ☐ Full-time

6. How do you meet your college expenses (i.e., tuition, books, fees, transportation to/from school)?

Self (job, savings, etc.)	None/Does not apply	Very little	Less than half	About half	More than half	All or nearly all
Family	None/Does not apply	Very little	Less than half	About half	More than half	All or nearly all

Spouse or partner	None/Does not apply	Very little	Less than half	About half	More than half	All or nearly all
Employer support	None/Does not apply	Very little	Less than half	About half	More than half	All or nearly all
Scholarships or grants	None/Does not apply	Very little	Less than half	About half	More than half	All or nearly all
Loans	None/Does not apply	Very little	Less than half	About half	More than half	All or nearly all

7. What age group do you belong to?
   Please select one:
   - ☐ 17-21
   - ☐ 22-25
   - ☐ 26-32
   - ☐ 33-42
   - ☐ 43-51
   - ☐ 52 and over

8. What racial group(s) do you identify as a part of?
   Please select all that apply:
   - ☐ African American/Black
   - ☐ Asian
   - ☐ Latino(a)/Hispanic
   - ☐ Native American Indian/Alaskan Native
   - ☐ Pacific Islander/Hawaiian Native
   - ☐ White
   - ☐ Prefer to self-describe _____

9. What gender do you identify as?
   Please select one:
   - ☐ Male
   - ☐ Female
   - ☐ Non-binary
   - ☐ Prefer to self-describe _____
   - ☐ Prefer not to say

Thank you for completing this survey!

The more responses received, the more information I have to help undergraduate students experiencing barriers to technology. Please share this survey link on your social media accounts so others can complete the same survey!

APPENDIX B

RAW DATA FOR DEVICE USE

Q2PersonalComputer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	1.9	1.9	1.9
	Weekly	6	11.5	11.5	13.5
	Daily	45	86.5	86.5	100.0
	Total	52	100.0	100.0	

Q2Mobile

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	6	11.5	11.5	11.5
	Less than Monthly	2	3.8	3.8	15.4
	Monthly	4	7.7	7.7	23.1
	Weekly	5	9.6	9.6	32.7
	Daily	35	67.3	67.3	100.0
	Total	52	100.0	100.0	

Q2PublicComputer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	16	30.8	30.8	30.8
	Less than Monthly	13	25.0	25.0	55.8
	Monthly	9	17.3	17.3	73.1
	Weekly	10	19.2	19.2	92.3
	Daily	4	7.7	7.7	100.0
	Total	52	100.0	100.0	

Q2PersonalComputer * Q2Mobile Crosstabulation

			Q2Mobile					
			Never	Less than Monthly	Monthly	Weekly	Daily	Total
Q2PersonalComputer	Never	Count	1[a]	0[a, b]	0[a, b]	0[a, b]	0[b]	1
		% within Q2PersonalComputer	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
		% within Q2Mobile	16.7%	0.0%	0.0%	0.0%	0.0%	1.9%
		% of Total	1.9%	0.0%	0.0%	0.0%	0.0%	1.9%
	Weekly	Count	1[a]	0[a]	0[a]	0[a]	5[a]	6
		% within Q2PersonalComputer	16.7%	0.0%	0.0%	0.0%	83.3%	100.0%
		% within Q2Mobile	16.7%	0.0%	0.0%	0.0%	14.3%	11.5%
		% of Total	1.9%	0.0%	0.0%	0.0%	9.6%	11.5%
	Daily	Count	4[a]	2[a]	4[a]	5[a]	30[a]	45
		% within Q2PersonalComputer	8.9%	4.4%	8.9%	11.1%	66.7%	100.0%
		% within Q2Mobile	66.7%	100.0%	100.0%	100.0%	85.7%	86.5%
		% of Total	7.7%	3.8%	7.7%	9.6%	57.7%	86.5%
Total		Count	6	2	4	5	35	52
		% within Q2PersonalComputer	11.5%	3.8%	7.7%	9.6%	67.3%	100.0%
		% within Q2Mobile	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	11.5%	3.8%	7.7%	9.6%	67.3%	100.0%

Each subscript letter denotes a subset of Q2Mobile categories whose column proportions do not differ significantly from each other at the .05 level.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Q2PersonalComputer Q2PersonalComputer	Equal variances assumed	9.928	.003	-1.629	50	.110	-.280	.172	-.625	.065
	Equal variances not assumed			-1.746	30.866	.091	-.280	.160	-.607	.047
Q2FamilyComputerHome Q2FamilyComputerHome	Equal variances assumed	2.072	.156	-.843	50	.403	-.268	.318	-.906	.371
	Equal variances not assumed			-.822	41.049	.416	-.268	.326	-.926	.390
Q2FamilyComputerAway Q2FamilyComputerAway	Equal variances assumed	1.681	.201	-.596	50	.554	-.137	.230	-.598	.324
	Equal variances not assumed			-.575	36.409	.569	-.137	.238	-.620	.346
Q2PublicComputer Q2PublicComputer	Equal variances assumed	.855	.359	.531	50	.598	.196	.370	-.547	.940
	Equal variances not assumed			.526	46.668	.601	.196	.373	-.555	.948
Q2Mobile Q2Mobile	Equal variances assumed	.134	.716	-.365	50	.717	-.143	.392	-.930	.644
	Equal variances not assumed			-.368	49.865	.715	-.143	.389	-.923	.638
Q2Tablet Q2Tablet	Equal variances assumed	1.915	.173	-.984	50	.330	-.429	.436	-1.304	.446
	Equal variances not assumed			-.974	46.186	.335	-.429	.440	-1.314	.457

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Q2PersonalComputer Q2PersonalComputer	Equal variances assumed	10.523	.002	-1.718	50	.092	-.297	.173	-.644	.050
	Equal variances not assumed			-1.501	23.450	.147	-.297	.198	-.706	.112
Q2FamilyComputerHome Q2FamilyComputerHome	Equal variances assumed	1.704	.198	.717	50	.477	.230	.321	-.415	.876
	Equal variances not assumed			.687	37.561	.497	.230	.335	-.449	.910
Q2FamilyComputerAway Q2FamilyComputerAway	Equal variances assumed	.936	.338	.183	50	.856	.042	.232	-.424	.509
	Equal variances not assumed			.169	31.382	.867	.042	.251	-.470	.554
Q2PublicComputer Q2PublicComputer	Equal variances assumed	.372	.545	-.332	50	.741	-.124	.374	-.876	.627
	Equal variances not assumed			-.325	41.580	.747	-.124	.382	-.896	.647
Q2Mobile Q2Mobile	Equal variances assumed	.460	.501	1.045	50	.301	.409	.392	-.377	1.196
	Equal variances not assumed			1.057	47.234	.296	.409	.387	-.369	1.187
Q2Tablet Q2Tablet	Equal variances assumed	.229	.634	.818	50	.417	.361	.441	-.525	1.246
	Equal variances not assumed			.814	44.500	.420	.361	.443	-.532	1.254

APPENDIX C

RAW DATA FOR WIFI USE

Q3CampusLib

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	9	17.3	17.3	17.3
	Less than Monthly	5	9.6	9.6	26.9
	Monthly	5	9.6	9.6	36.5
	Weekly	13	25.0	25.0	61.5
	Daily	20	38.5	38.5	100.0
	Total	52	100.0	100.0	

Q3CampusShared

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	14	26.9	26.9	26.9
	Less than Monthly	5	9.6	9.6	36.5
	Monthly	5	9.6	9.6	46.2
	Weekly	11	21.2	21.2	67.3
	Daily	17	32.7	32.7	100.0
	Total	52	100.0	100.0	

Q3Home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	6	11.5	11.5	11.5
	Less than Monthly	3	5.8	5.8	17.3
	Monthly	1	1.9	1.9	19.2
	Weekly	4	7.7	7.7	26.9
	Daily	38	73.1	73.1	100.0
	Total	52	100.0	100.0	

Q3FriendFamilyHome

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	15	28.8	28.8	28.8
	Less than Monthly	4	7.7	7.7	36.5
	Monthly	7	13.5	13.5	50.0
	Weekly	15	28.8	28.8	78.8
	Daily	11	21.2	21.2	100.0
	Total	52	100.0	100.0	

Q3PublicOther

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	10	19.2	19.2	19.2
	Less than Monthly	9	17.3	17.3	36.5
	Monthly	14	26.9	26.9	63.5
	Weekly	14	26.9	26.9	90.4
	Daily	5	9.6	9.6	100.0
	Total	52	100.0	100.0	

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Q3CampusLib Q3CampusLib	Equal variances assumed	.178	.675	-.127	50	.899	-.055	.429	-.916	.807
	Equal variances not assumed			-.126	44.259	.900	-.055	.432	-.924	.815
Q3CampusShared Q3CampusShared	Equal variances assumed	1.079	.304	-.352	50	.726	-.164	.464	-1.096	.769
	Equal variances not assumed			-.347	42.509	.731	-.164	.472	-1.116	.789
Q3Home Q3Home	Equal variances assumed	.029	.866	-.295	50	.769	-.118	.400	-.922	.685
	Equal variances not assumed			-.297	46.122	.768	-.118	.398	-.920	.684
Q3FriendFamilyHome Q3FriendFamilyHome	Equal variances assumed	.181	.673	.853	50	.398	.373	.437	-.505	1.250
	Equal variances not assumed			.845	43.812	.402	.373	.441	-.516	1.261
Q3PublicLibrary Q3PublicLibrary	Equal variances assumed	.786	.380	.432	50	.667	.164	.378	-.596	.924
	Equal variances not assumed			.420	40.149	.677	.164	.390	-.624	.951
Q3PublicOther Q3PublicOther	Equal variances assumed	.667	.418	.684	50	.497	.245	.359	-.475	.966
	Equal variances not assumed			.667	40.823	.509	.245	.368	-.498	.989

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